precursor niche. Finally, Treg adoptive transfer enhances B cell reconstitution and induces tolerance to bone marrow grafts even in the absence of conditioning providing a new tool for clinical translation especially in children with SCID or hemoglobinopathies.

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Prospective Assessment of Familial Financial Hardship after Hematopoietic Cell Transplantation

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Background: Hematopoietic cell transplantation (HCT) is a resource-intensive therapy. The economic costs to the medical system have been well-described; however, few studies have prospectively assessed the financial consequences of HCT for patients and their families.

Methods: We report preliminary data from a prospective study of financial hardship related to HCT. We mailed a 41-item questionnaire to adult patients approximately six months post-allogeneic or autologous HCT at three sites (Dana-Farber Cancer Institute [DFCI], Roswell Park Cancer Institute, and Mayo Clinic Arizona). The questionnaire was developed with input from a focus group of HCT nurses and social workers, and underwent formal cognitive debriefing with HCT patients. HCT-related clinical outcomes associated with hardship will be assessed at one year. We present the financial experience of the first cohort of DFCI patients.

Results: As of October 1, 2014, of 174 surveys mailed, 124 had been received (71%). Patients were a median of 174 days post-HCT. The mean age was 57.6 years, 49% had had an allogeneic transplant, 95% were white, 75% were married, 24% had at least one child at home, 52% were currently working at least part-time or taking a leave of absence, and 46% had at least a bachelor's degree. Patients came from 10 states; the top three were MA (45%), ME (14%) and NY (13%). Compared to before transplant, 48% reported a decline in monthly household income. Nearly half (48%) were also only somewhat, slightly or not at all satisfied with their present financial situation, and 41% reported somewhat, moderate or extreme difficulty in making bill payments. About one out of five (21%) reported substantial hardship, defined as not having enough money at the end of the month, and 52.4% (95% CI [43.5, 61.3]) reported either unsatisfactory income, difficulty making payments, or substantial hardship. Transplant type, gender, age, race, employment and college degree were not significantly associated with substantial hardship; however, being unmarried ($p < .03$) and lower income level ($p < .02$) were. Patients reported several financial coping strategies post-HCT (see table), which differed among those with substantial hardship.

Conclusions: The majority of HCT patients face financial difficulties, particularly those who are not married or have more limited income. Coping strategies vary, although spending on prescription medicines is largely preserved. Several strategies are much more prevalent among those with substantial hardship. The ultimate effects of financial burden on HCT outcomes remain to be demonstrated.

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Older Survivors of Allogeneic Hematopoietic Cell Transplantation (HCT) with Chronic Graft Vs. Host Disease (cGvHD) Demonstrate Higher Risk of Frailty As Compared with Autologous HCT Recipients: A Report from the Bone Marrow Transplant Survivor Study-2

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Background: Approximately 10% of older (≥65y) individuals in the general population demonstrate frailty (Collard RM et al. J Am Geriatr Soc. 2012;60:1487-92). HCT recipients are at risk for accelerated aging, given the high-intensity therapeutic exposures and excessive burden of morbidity after HCT. We examined the prevalence and predictors of frailty in elderly (≥65y) HCT survivors.

Methods: Participants included 276 older HCT survivors (median age at study participation: 70 y (65-84), who had undergone HCT (allogeneic: n=83, autologous: n=196) between 1985-2010. Median time from HCT was 8.9y (3.7-29.1). Following well established survey-based screening tools for frailty (Pialoux T et al. Geriatr Gerontol Int. 2012;12:189-97), all participants completed a self-report survey that included questions pertaining to: low lean muscle mass, self-reported exhaustion, low energy expenditure, slow walking speed, and muscle weakness. Prefrailty included 2, while frailty included ≥3 conditions.

Results: The prevalence of prefrailty and frailty was 28% and 13%, respectively.

Predictors of pre-frailty and/or frailty

After adjusting for age at enrollment, sex, race, education and employment status, survivors with low income (annual household income <$50,000/annual personal income <$20,000) were 3.2 times more likely to report pre-frailty and/or frailty (OR=3.2, 1.5-6.9, p=0.003); furthermore, allogeneic HCT survivors with a history of cGvHD were 2.7 times more likely to report pre-frailty and/or frailty (OR=2.7, 1.2-6.3, p=0.02) than autologous HCT survivors.

	Reduced spending on essential items	Withdrew from savings	Borrowed money to pay bills	Reduced leisure activities	Cut back on prescribed medicine
Percent of all respondents	47%	43%	24%	59%	5%
Odds ratio for substantial hardship vs. other [95% CI]	6.4 [2.2, 18.7]	3.5 [1.4, 8.9]	7.9 [3.0, 20.7]	7.2 [2.0, 25.6]	8.4 [1.4, 48.6]

Predictors of frailty

Allogeneic HCT survivors with cGvHD were significantly more likely to report frailty than autologous HCT survivors (29% vs. 10%, p=0.004), but the prevalence rate for frailty among allogeneic HCT survivors without cGvHD was comparable to autologous HCT survivors (14% vs. 10%, p=0.4). Multivariable logistic regression revealed that allogeneic HCT survivors with cGvHD were 4.6 fold more likely to report frailty than autologous HCT survivors (OR=4.6, 1.6-13.2, p=0.004). Of note, age at HCT, age at study participation, race/ethnicity, year of HCT, and diagnosis were not associated with frailty.

Conclusions: Our study demonstrates that the prevalence of frailty among older survivors of allogeneic HCT with a history of cGvHD is about three times that seen among older individuals in the general population, as well as that seen among autologous HCT recipients. On the other hand, the prevalence of frailty among older survivors of autologous HCT as well as allogeneic HCT recipients without cGvHD is comparable to that in the general population. Lower income, possibly reflecting compromise in nutrition, or access to medical care, is associated with increased prefrailty and frailty. The study identifies vulnerable populations among older HCT survivors needing close monitoring to prevent and manage morbidity.

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Cardiac CT Imaging Is a Feasible Screening Strategy for Coronary Artery Disease (CAD) in Long Term Allogeneic Stem Cell Transplant (Allo-SCT) Survivors

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Introduction: Significant increases in CAD risk and cardiovascular events have been described in long-term allo-SCT survivors compared to age and gender-matched population controls. Since pharmacologic interventions, such as statins, positively influence the evolution of CAD and subsequent cardiovascular events, an effective screening strategy is essential. Screening for CAD has hitherto relied upon clinical assessments such as the Framingham cardiovascular risk score but the optimum screening strategy in this unique population is undefined.

Method: We conducted a prospective non-randomized study using cardiac CT to evaluate Agatston coronary calcium scoring by CT with concomitant coronary CT angiography for screening asymptomatic allo-SCT survivors. 55 subjects (32 males; 23 females) with a median age of 41 years (range 17 - 69) at transplant and a median follow up interval of 10 years (range: 4-21) were studied. Angiography was excluded in 5 subjects with renal dysfunction. CAD was defined as presence of lesions on CT angio and/or calcium score >0 (for subjects without angiography). 10-year Framingham scores were also calculated: 3 were classified as high risk, 5 were intermediate and 47 were low risk.

Results: CAD was detected in 24 of 55 (44%) subjects. Characteristics of coronary plaques were: 21.5% calcified, 55% mixed calcified/non-calcified, and 23.5% non-calcified. Coronary lesions were mostly non-obstructive (86%), but obstructive lesions were seen in 14%. Lesion distributions by arterial territory were: left main 12.8%, left anterior descending 30.8%, left circumflex 23.1% and right coronary artery 33.3%. Additionally, 16 (67%) patients with CAD had either aortic root or mitral valvular calcification.

Radiation exposure during the procedure was negligible, at a median of 0.72 mSv for the coronary calcium score and 1.12 mSv for the coronary CT angiogram. There were no adverse events.

Coronary calcium scoring had a sensitivity of 73% (95% C.I. 55% to 85%) and a specificity of 100% (95% C.I. 86% to 100%) compared to CT angiography. In addition, calcium score was able to detect CAD in 2 of 5 subjects who could not have angiograms because of renal dysfunction. Current (2010 AHA/ACC) guidelines suggest a role for coronary calcium scoring for screening asymptomatic non-transplant individuals with intermediate Framingham risk. However, cardiac CT detected CAD in 18 of 47 (38.3%) low Framingham risk survivors. Coronary calcium scoring alone may be adequate for screening and avoids the use of IV contrast.

Conclusion: Accelerated CAD was detected in 44% of our alloSCT survivors by cardiac CT screening. Coronary calcium score with or without CT angiogram is a safe, feasible and sensitive screening technique for CAD. It is informative even in asymptomatic, low-risk survivors and is far more sensitive than the Framingham risk score.

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Long-Term Follow-up after Hematopoietic Stem Cell Transplantation for Patients with Fanconi Anemia: A Single Center Experience on 157 Patients Surviving 2 or More Years after Transplant

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Allogeneic transplantation is the only curative treatment for the hematological complications of Fanconi anemia. Survival after transplantation has improved dramatically over the past decade, however, only limited data are available regarding late complications after transplantation. Therefore, we studied late complications in 157 patients who survived for at least 2 years after their first transplantation, between 1988 and 2011. The median follow up of this cohort is 9 years (range 2–25). Marrow failure was the most common indication for transplantation (80%) and most (71%) grafts were from a related donor. Bone marrow was the predominant graft (89%). Chimerism studies were available for 147 of 157 (94%) patients; at last follow up, 110 of 147 (76%) patients reported donor chimerism >95%, 27 (18%), between 90-95%, 8 (5%), <90% and the remaining 2 patients (1%), <30%. The 2-year cumulative incidence of chronic GVHD at 2 years was 35%. At study entry 32 of 55 patients with chronic GVHD were receiving immunosuppressive treatment. The probabilities of overall survival for patients who survived at least 2 years was 95%, 90% and 79%, 5, 10 and 15 years after transplantation. Late mortality was associated with transplant period (prior to 2003), history of chronic GVHD and, occurrence of squamous cell carcinoma (SCC).